DEGENERATIVE DISC DISEASE

Robert L. Deters, MD

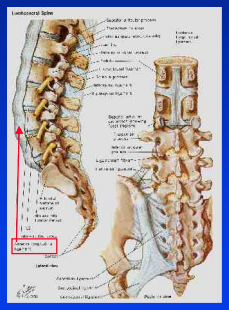
Objectives

- Natural history of degenerative disk disease
- anatomic structures that cause pain
- interventional pain management strategies
- Common complications

Spine Anatomy

Anterior:

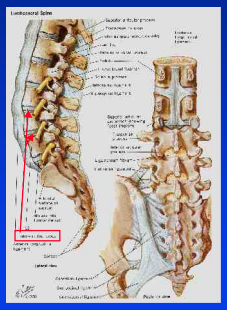
•Anterior longitudinal ligament



Spine Anatomy

Anterior:

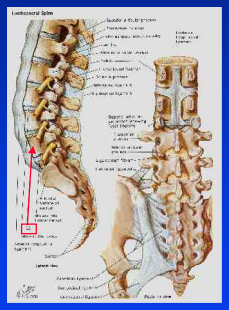
•Disc



Spine Anatomy

Anterior:

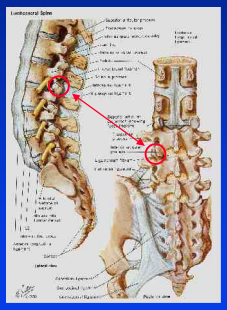
•Vertebral body



Spine Anatomy

Posterior:

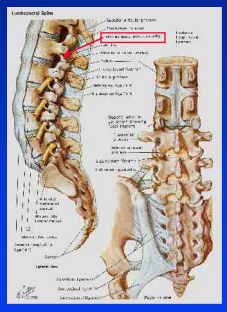
•Facets



Spine Anatomy

Posterior:

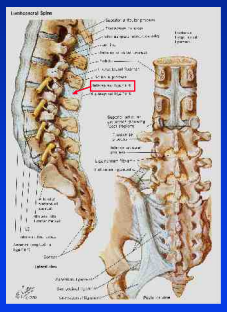
•Pars interarticularis



Spine Anatomy

Posterior:

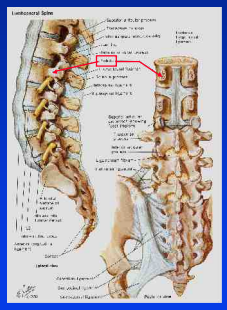
•Interspinal ligament



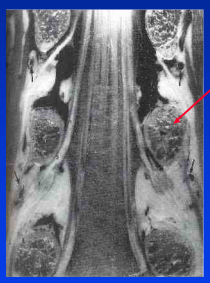
Spine Anatomy

Connected by:

•The pedicles



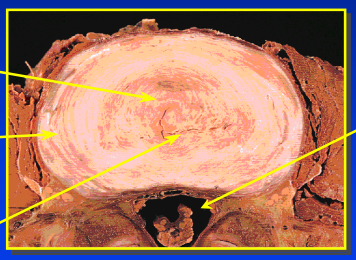
Pedicles



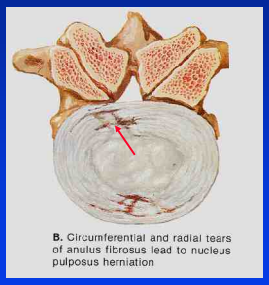
Intervertebral Disc

- Supports vertebral bodies
- Serves as a hydraulic shock absorber
- Undergoes degeneration naturally with age
- Degeneration = desiccation (drying up)
- Desiccation leads to shrinking
- Shrinking leads to loss of disc height and fissures
- Loss of disc height leads to instability
- Any of these can lead to pathology

Intervertebral Disc



Disc degeneration



B. Circumferential and radial tears of anulus fibrosus lead to nucleus pulposus herniation

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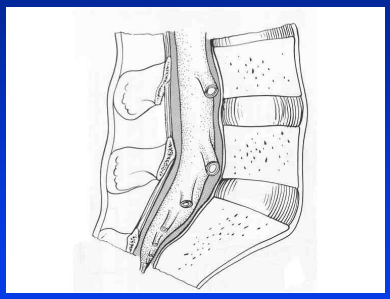
Disc Morphology



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Disc Degeneration

X-ray - single level degeneration

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Disc Degeneration

Healthy discs look light on MRI

MRI - single level degeneration

MRI - two level degeneration

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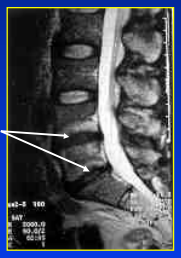
Disc Degeneration

Degenerated discs look dark on MRI



MRI - single level degeneration

MRI - two level degeneration

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Disc Degeneration

Hyper intense zone From annular tear

MRI - single level degeneration

MRI - two level degeneration

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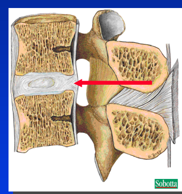
Sources of Low Back Pain

- Disc
  - Only annulus has blood supply
  - Nerve fibers in annulus
  - Annular rim tears = hemorrhage, swelling
  - Painful discs have lower pH



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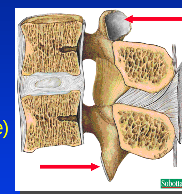
Sources of Low Back Pain

- Facet joint
  - Lined with hyaline cartilage (hip, knee)
  - Undergoes same degeneration



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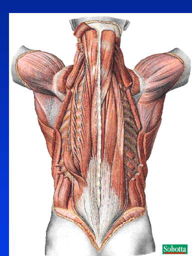
Sources of Low Back Pain



- Lumbar Muscles (400 muscles)

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Sources of Leg Pain

- Referred
  - tissues of similar somatic origin
  - buttock, thigh, calf
  - absence of numbness,weakness,reflex loss
  - facet irritation associated
- Radicular
  - nerve irritation, compression
  - pain correlated with specific nerve function
- Neurogenic Claudication

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Intervertebral Disc

Disc bulge:

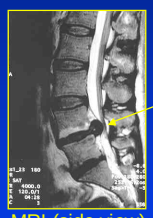
- diffuse protrusion due to loss of hydraulic support from degeneration
- Not associated with nerve impingement

Intervertebral Disc

Disc herniation:

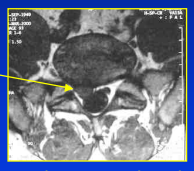
- Rupture of disc fragment through annulus
- Associated with neurological dysfunction

Disc Herniation



MRI (side view)

Herniation



MRI (cross-section view)

Discogenic pain

- Treatment options limited
- Surgical intervention
- Diskectomy and fusion
- Disk nucleoplasty?

Radicular pain due to disk degeneration

- Epidural steroid injection
- Interlaminar
- transforaminal

Facet Pain

- Intraarticular facet injections
- Medial branch blocks
- radiofrequency

Myofascial Pain

- Physical therapy
- Trigger point injections

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Epidemiology

- 80% of population will have back pain
- 50% will become disabled at some time
- 4% will become chronic
- 4% represent 80% of cost to society
- 1%-3% will undergo surgery

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Evaluation

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Sources of Back Pain

- Sitting increases disc pressure
  - » Discogenic pain
  - » Annular tears
  - » Disc herniations
  - » Compression fractures
- Standing increases facet pressure
  - » Facet arthritis
  - » Spinal stenosis
  - » Spondylolisthesis

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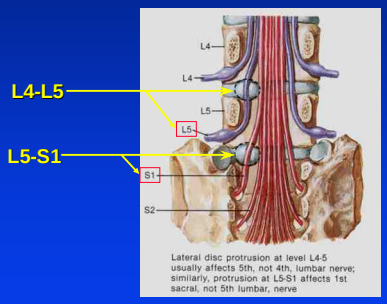
Disc herniation



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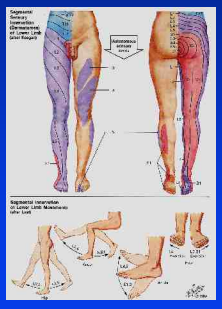
Nerve distribution



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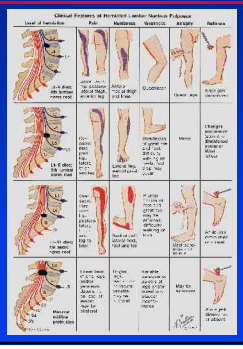
Neurological Exam



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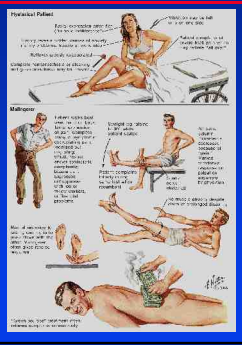
Look out!



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Waddell's Signs

Nonorganic pain behavior

"functional overlay"

Designed to predict successful surgery

Sometimes misused

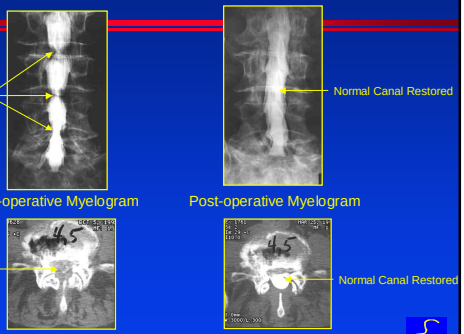
"The Green Poultice"

"Green poultice" treatment often relieves symptoms miraculously

Spinal Stenosis

Spinal Stenosis

Spinal Stenosis



CT Scan

Spondylolisthesis

X-ray

MRI

Spondylolysis

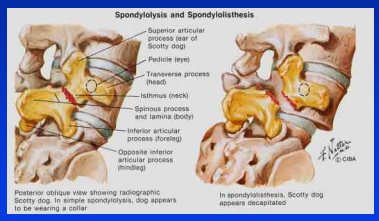
Lateral AP

Spondylolysis

X-ray

CT

The "Scotty Dog" Sign



Spondylolysis

Treatment ?